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INSTRUCTION MANUAL

MODEL 26A
RF MILLIVOLTMETER
CALIBRATOR

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5/85

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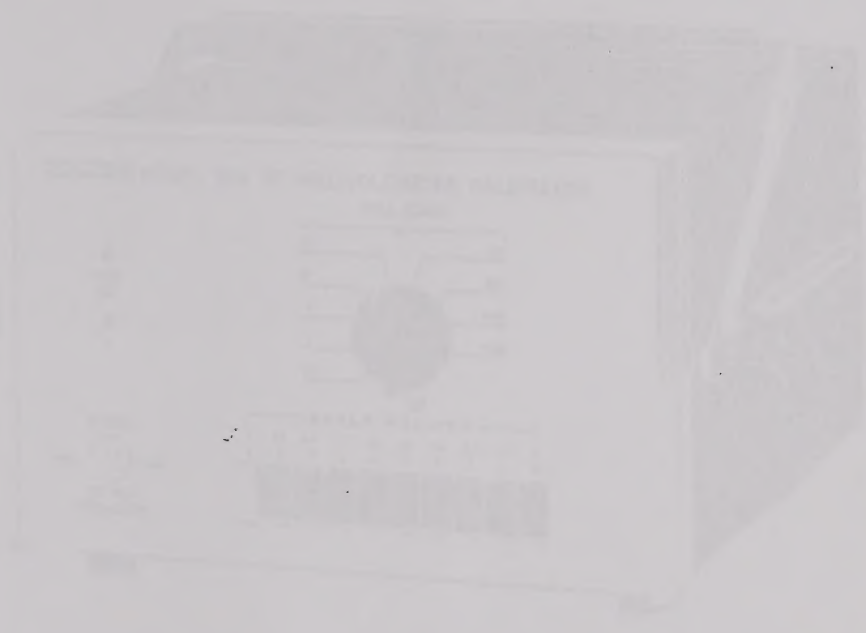

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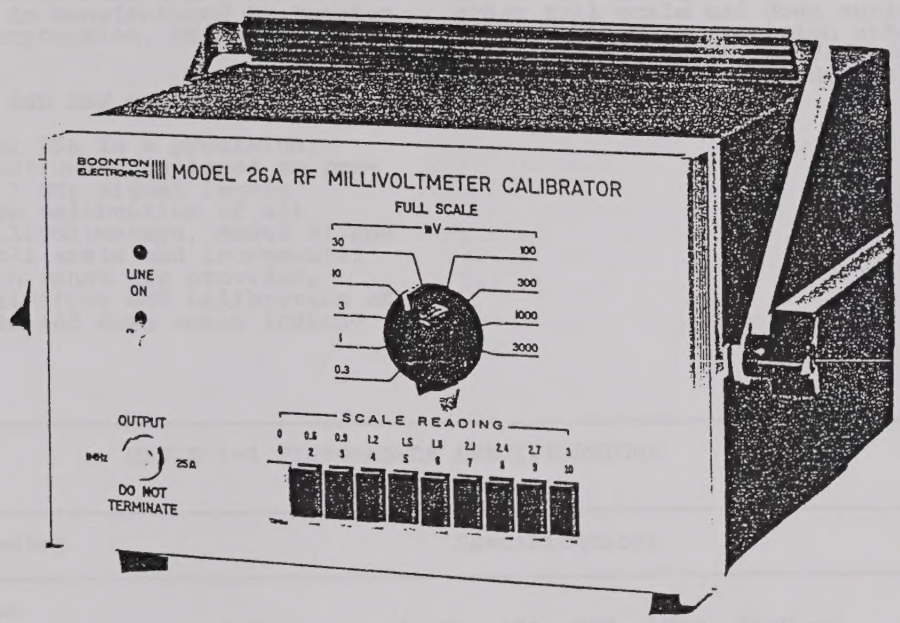
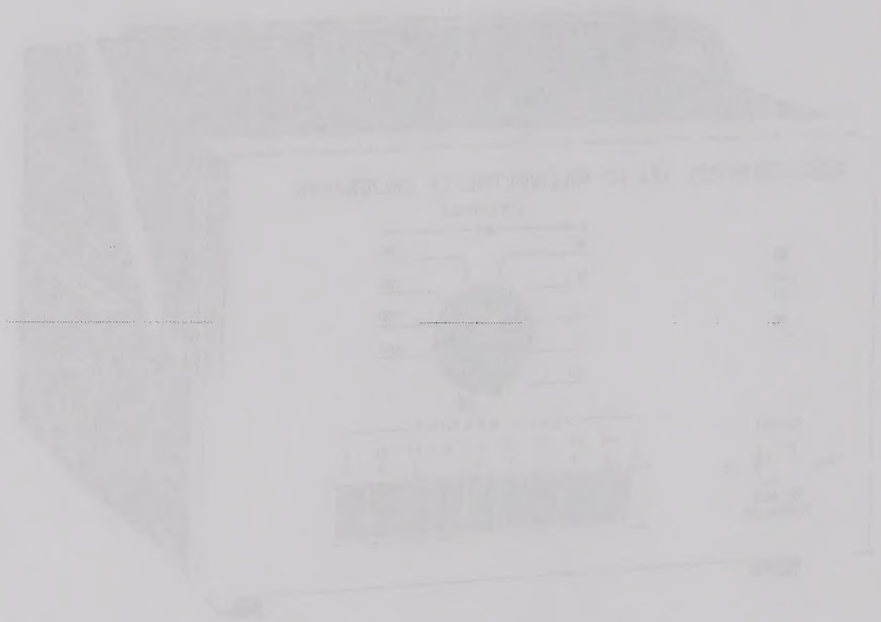


Figure 1-1

Model 26A RF Millivoltmeter Calibrator



SECTION I

INTRODUCTION

1-1. SCOPE OF MANUAL.

1-2. This handbook provides descriptive data, operating instructions, theory of operation, maintenance instructions, schematics, and a parts list for the Model 26A RF Millivoltmeter Calibrator. The Model 26A is manufactured by Boonton Electronics Corporation, Randolph, New Jersey.

1-3. PURPOSE AND USE OF EQUIPMENT.

1-4. The Model 26A is a precision, solid-state instrument designed to provide accurate 1 MHz signal levels required in the calibration of all Boonton RF millivoltmeters, Model 91 and 92 series. Full scale and incremental values for each range are provided, allowing verification and calibration of both full scale and down scale indications.

1-5. TRACEABILITY. The Model 26A is factory calibrated by instrumentation whose accuracy is traceable to the National Bureau of Standards. Periodic calibration of 0.3, 0.1, and 0.06 volt outputs is accomplished using thermal transfer techniques. The accuracy of other full scale and down scale ranges is determined by precision attenuators which are tested at the factory and should not require periodic calibration.

TABLE 1-1 PERFORMANCE SPECIFICATIONS

Parameter	Specifications
Voltage Ranges Full Scale Down Scale	 0.3, 1, 3, 10, 30, 100, 300, 1000, 3000 mV 20% to 100% in 10% steps
Output Voltage Accuracy	±0.5% (at 25°C ±5°C for 90 days, 15 minute warm-up)
Temperature Influence	±0.01%/°C from 0 to 50°C
Harmonic Distortion	<0.15% total harmonic distortion
Output Frequency	1 MHz, crystal controlled
Output Impedance	25 ohms ±0.5%
Temperature Operating Non-Operating	 0 to 50°C -20 to 75°C
Input Power	100, 120, 200, 240 V ±10%, 50 to 400 Hz, 7 VA
Dimensions	5.2" high (without feet), 8.3" wide, 11.5" deep (132 x 211 x 292 mm)
Weight	7.75 lbs. (3.6 kg)

SECTION II

OPERATION

2-1. GENERAL.

2-2. This section contains instructions for the installation and operation of the Model 26A RF Millivoltmeter Calibrator. Although the design of the Model 26A reflects careful attention to human engineering factors regarding ease of use, it is strongly recommended that the operator familiarize himself with the material in this section before attempting to operate the equipment; otherwise, the full capabilities of the equipment may not be realized in use.

2-3. INSTALLATION.

2-4. UNPACKING. The Model 26A is shipped complete and is ready for use upon receipt. Unpack the equipment from the shipping container and inspect it for damage that may have occurred during shipment. Check that all operating controls operate over their full range without binding.

NOTE

Save the packing material and container for possible use in reshipment of the equipment.

2-5. MOUNTING. For bench mounting, choose a clean, sturdy, uncluttered mounting surface. For rack mounting, an accessory package is required. The accessory rack mounting kit, Model 92-1A, will mount a single Model 26A in either a right or left hand configuration. The accessory rack-mounting kit, Model 92-1B, will mount two Model 26A's, or a single Model 26A plus an additional half-rack Boonton instrument, such as a Model 92 RF Millivoltmeter.

NOTE

Feet and bail may be removed from the bottom of the instrument to clear adjacent rack mounted units.

2-6. POWER REQUIREMENTS. A 100, 120, 200, or 240 volt, 50 to 400 Hz, single phase, AC power source is required for operation of the Model 26A. Power required is 7 VA.

CAUTION

Always make certain that the line voltage switch on the rear panel of the Model 26A is set to the appropriate position and that a fuse of the correct rating is installed in a fuse holder on the rear panel before connecting the Model 26A to any AC power source. See Paragraph 2-11 for details.

2-7. CABLE CONNECTIONS. Connecting cables are not supplied with the equipment. The output connector of the Model 26A is a Type BNC female. A BNC male to Boonton probe adapter is supplied with each Model 26A (Adapter storage is by means of a rear panel component clip). The input connector of any Boonton voltmeter probe will connect directly to this adapter. If a connecting cable is required because of a remote position of the voltmeter probe to the Model 26A, this cable should be as short as possible to avoid transmission errors.

2-8. OPERATING CONTROLS AND CONNECTORS.

2-9. All controls and connectors used during operation of the Model 26A are shown in Figures 2-1 and 2-2. Table 2-1 list.

2-10. POWER APPLICATION.

2-11. The Model 26A is designed for operation from either a 100, 120, 200, or 240 volt, 50 to 400 Hz, AC power source. To apply power, proceed as follows:

a. Determine the line voltage at the power output receptacle. Slide the plastic cover on the rear panel power assembly to uncover the section that houses the fuse. Look at the small printed circuit card located below the fuse and note the three digits that appear at the left corner of this board. If these digits agree with the line voltage to be applied, the instrument is ready for power application. If these digits do not agree with the line voltage, remove the board with small pliers and rotate and/or turn the board until the three digits in the left corner agree with the line voltage. Insert the board in this position.

b. Check the value of the fuse in the rear panel fuseholder. For 100 or 120 volt operation, the fuse should be a 0.1 ampere, MDL Slo-Blo type; for 200 or 240 volt operation, a 0.06 ampere, MDC Slo-Blo type. If the rating of the fuse is incorrect for the available line voltage, install a fuse of the proper rating in the fuseholder. Slide the plastic cover back over the fuseholder.

2-11. (Cont.)

WARNING

The Model 26A is designed to operate from a 3-terminal (one ground) AC power receptacle. To eliminate a potential shock hazard to operating personnel, use a 3-prong to 2-prong adapter if only a 2-terminal AC power receptacle is available. Connect the ground wire of the adapter to the power receptacle ground.

c. Connect the detachable power cord of the Model 26A to the instrument and to the AC power receptacle (with adapter, if required).

2-12. OPERATING PROCEDURE.

2-13. GENERAL. The operating procedure for the Model 26A is simple and straight forward. There are no panel adjustments and no meter indications to consider. The 1 MHz output voltage is directly set by a combination of the panel-mounted FULL SCALE rotary switch and the SCALE READING pushbutton switches. The specific order in which these switches are operated depends on the instrument under test and the particular ranges or indications of the instrument that are to be checked or calibrated. If a full check or calibration is to be made of the instrument under test, the sequence of output levels is described in the instruction manual for that instrument.

2-14. ZEROING PROCEDURE. As described in the instruction manual of the instrument under test, the instrument and its probe should be operated for a long enough period to reach thermal equilibrium, and then the instrument should be zeroed on its most sensitive range, following the procedure outlined in the instruction manual. The white ZERO pushbutton switch on the Model 26A provides a convenient method of establishing a zero voltage level when the instrument and its probe are connected to the Model 26A.

2-15. LOAD MATCHING CONSIDERATIONS. The output jack of the Model 26A provides a 25 ohm source impedance. The output voltage levels established by the panel switches of the Model 26A will be correct only when the Model 26A is connected to a high impedance load, such as a Boonton Series 91 RF Probe.

TABLE 2-1. OPERATING CONTROLS, INDICATORS AND CONNECTORS

Control, Indicator or Connector	Figure and Index No.	Function
LINE ON Switch	2-1, 1	Permits operator to control application of input AC power
LINE ON Indicator	2-1, 2	Indicates that AC power is applied to the equipment
FULL SCALE Switch	2-1, 3	Permits operator to select output voltage in full scale steps of 1-3-10 sequence from 0.3 to 3000 mV
SCALE READING Pushbutton Switches	2-1, 4	Permits operator to select down scale increments on any full-scale range from 100% to 20%
ZERO Pushbutton	2-1, 5	Reduces the output of the calibrator to zero, allowing the operator to adjust the zero control on the millivoltmeter under test
OUTPUT Connector	2-1, 6	Type BNC female connector for connection to the instrument under test
Line Cord/Fuse Assembly	2-2, 1	Permits conversion of AC input to proper voltage and fuse ratings, as well as providing recessed terminals for connecting the detachable line cord

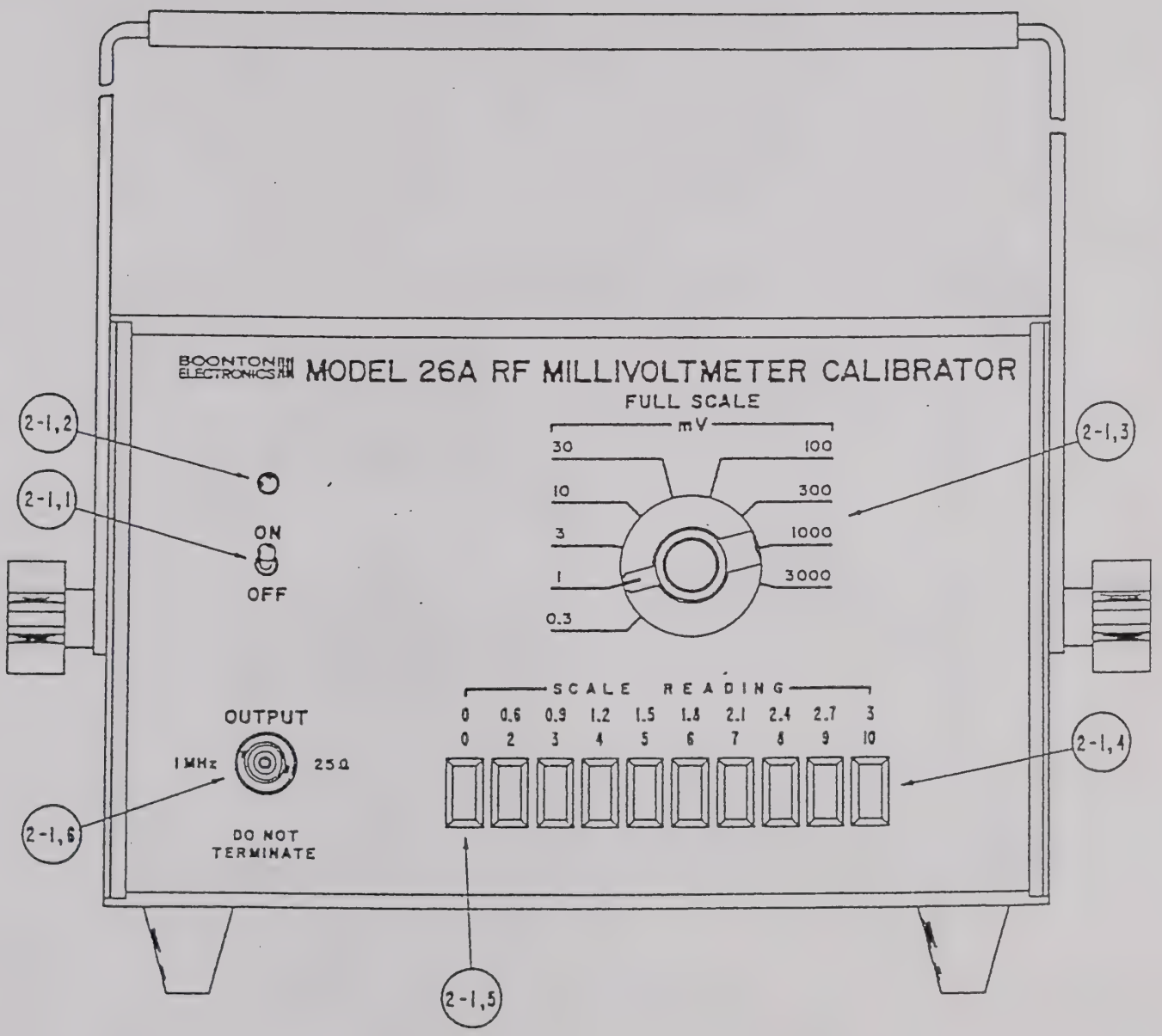


Figure 2-1. Controls and Connectors Used During Operation

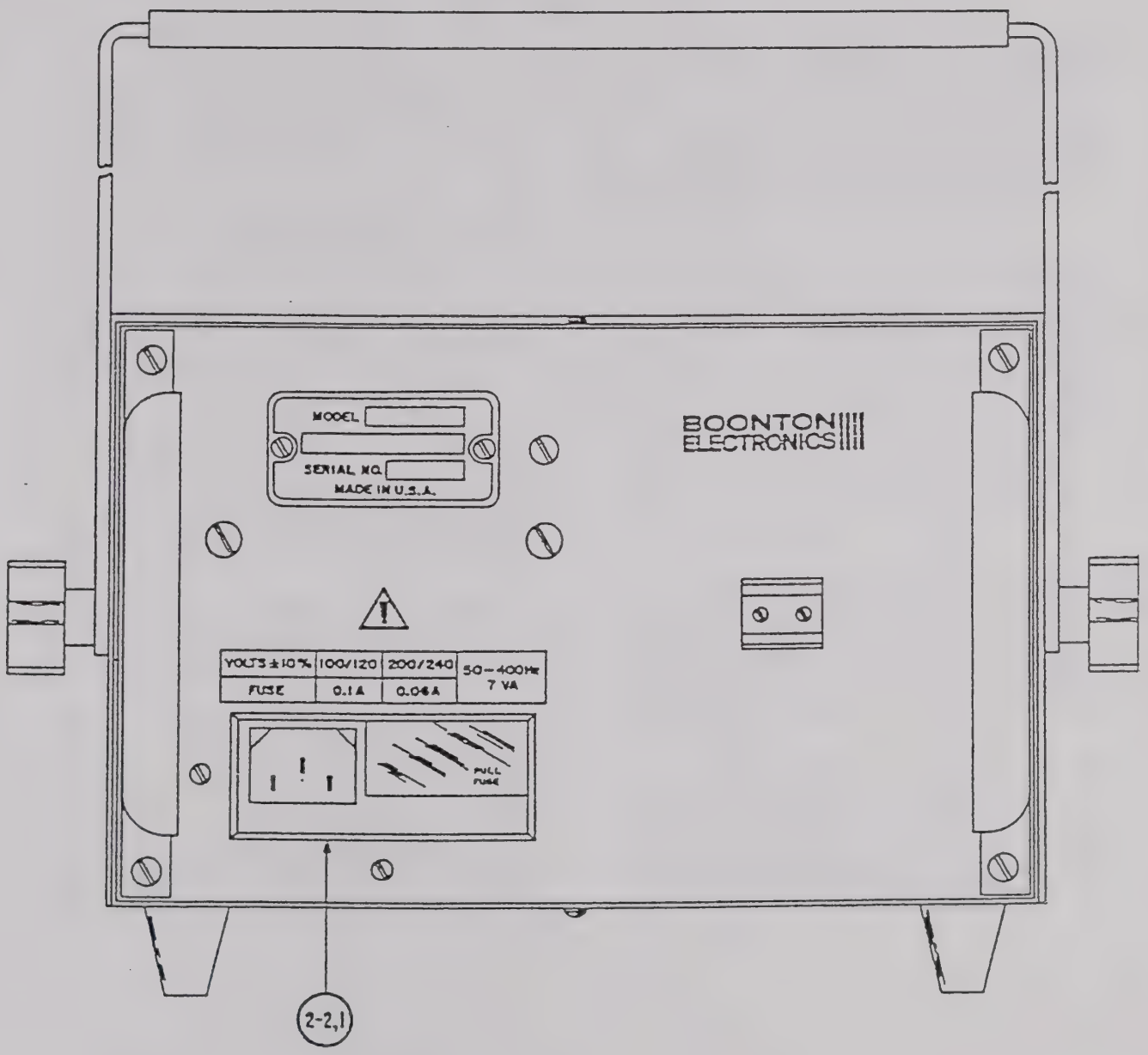


Figure 2-2. Controls and Connectors Used During Operation

SECTION III

THEORY OF OPERATION

3-1. GENERAL.

3-2. The block diagram of the Model 26A is shown in Figure 3-1. The major components are the 1 MHz oscillator, power amplifier, low-pass filter, AGC loop, voltage reference, precision attenuator and power supply.

3-3. 1 MHz OSCILLATOR. (Refer to the schematic at the end of this manual) A 1 MHz crystal controlled oscillator is formed by the interconnection of A2 IC1A, A2 IC1B and crystal A2 Y1. During normal operation pin 12 of A2 IC1 is held at +5 volts. When the front panel ZERO button is depressed, however, this pin is grounded, thereby inhibiting oscillation. A2 IC1C buffers the oscillator and the power amplifier.

3-4. POWER AMPLIFIER. The signal from A2 IC1C drives the base of A2 Q2 which causes collector current to be switched at a 1 MHz rate. A2 L3, A2 L4, A2 C9 and A2 C10 insure proper coupling to the low pass filter. A2 CR3 prevents large negative voltages on the collector of A2 Q2.

3-5. LOW PASS FILTER. The low-pass filter consists of A2 L5-L7, and A2 C11-C14. The purpose of this filter is to reduce harmonic content in the output signal.

3-6. AGC LOOP. The peak voltage at the junction of A2 L7 and A2 R20 is coupled to pin 2 of amplifier A2 A2 via diode detector A2 CR4. An equal DC voltage is applied to pin 3 of A2 A2 via A2 CR2. A2 CR2 and A2 CR4 are matched and loaded to provide optimum temperature performance. Capacitor A2 C8 provides necessary loop compensation. Pin 6 of A2 A2 provides the collector voltage of A2 Q2 through emitter follower A2 Q3 and current limit transistor A2 Q4. Excessive collector current through Q2 causes A2 Q4 to conduct and reverse bias A2 Q3. This normally occurs when the calibrator output is shorted. This integral feedback loop connection makes the junction of A2 L7 and A2 R20 appear as a voltage source which tracks to DC reference voltage with virtually no offset. A2 R20 now determines the output impedance of the power amplifier.

3-7. REFERENCE. The primary voltage reference is A2 CR1. The voltage across A2 CR1 is applied to a precision voltage divider and calibration pot. The precision divider formed by A2 R6-R14 provides eight equal increments below full scale. Full Scale reference is set with the calibration pots A3 R4 and A3 R18. The proper down scale reference is available at the divider taps. This voltage is then applied to pin 3 of amplifier A2 A1 which is connected to have a modest amount of gain. A2 R3 adjusts the input offset of A2 A1. The voltage at pin 6 of A2 A1 is equal to the peak output voltage required.

3-8. PRECISION ATTENUATOR. This portion of the instrument provides the full scale voltage settings, resistors R2 - R12 are arranged in π-section, 50 Ω, precision pads. There are two 30 dB pads, one 20 dB pad and one 10 dB pad. These are connected individually or in combinations to provide the 80 dB range required.

3-9. POWER SUPPLY. The AC voltage from T1 is converted to DC by CR1 and C1. A regulator circuit consisting of A3 IC1 and A3 A1 provides at 15 volt $\pm$0.1 volt output to the oscillator assembly. An additional 5 volt supply is generated by A2 Q1 and associated components for the oscillator integrated circuit.

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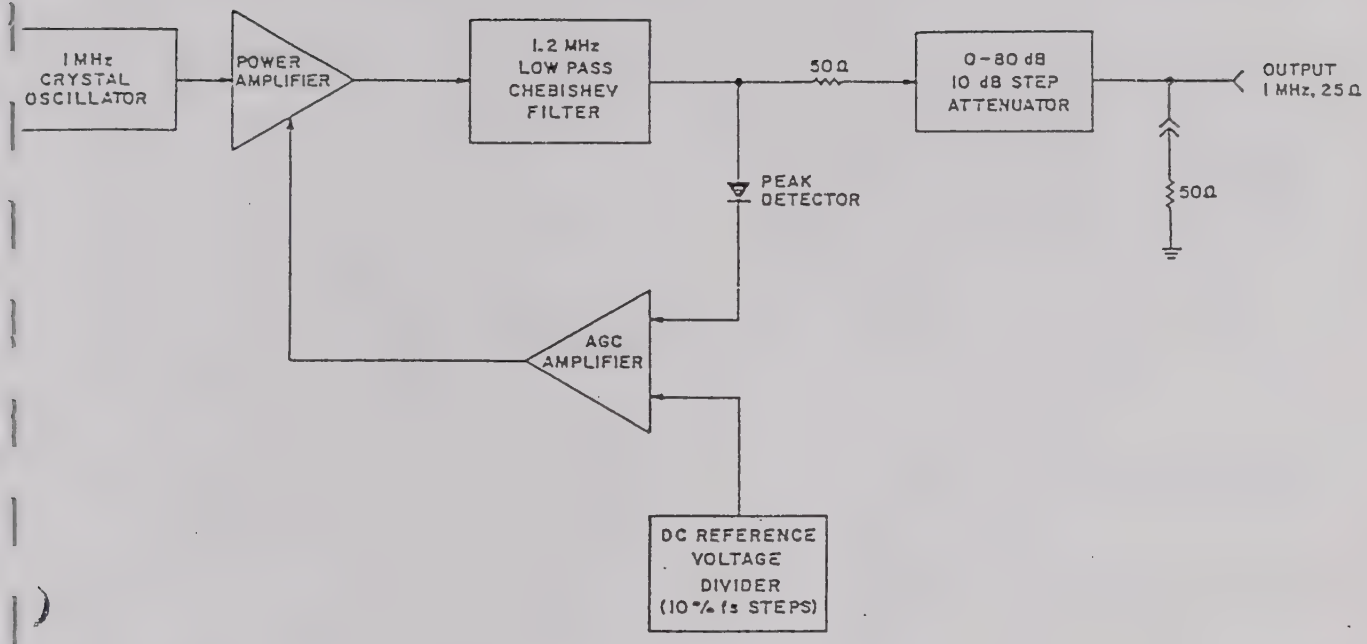


Figure 3-1. 26A Block Diagram

SECTION IV

MAINTENANCE

4-1. GENERAL.

4-2. This section contains maintenance and calibration instructions for the Model 26A. The specific items covered are:

a. Assembly and component identification

b. Required test equipment

c. Performance checks

d. Adjustment and calibration

4-3. ASSEMBLY AND COMPONENT IDENTIFICATION.

a. Figure 4-1 identifies the physical location of the principal sub-assemblies. Table 4-1 lists the sub-assembly functions.

b. Components are identified by their designator numbers. A component can be quickly located by referring to Figure 4-1 to locate the assembly, and to the schematic drawing.

TABLE 4-1
SUB-ASSEMBLY FUNCTIONS

ASSEMBLY	DESCRIPTION
A1	Precision Attenuator
A2	Oscillator PC Board
A3	Switch Attenuator

4-4. REQUIRED TEST EQUIPMENT. Table 4-2 is a list of equipment required to test and calibrate the Model 26A. Also in this table is a list of pertinent specifications if a substitution has to be made for the recommended piece of equipment.

4-5. PERFORMANCE CHECKS. Sections 4-6 and 4-7 recommend methods to verify the Model 26A specifications outlined in the beginning of this manual. It is important to allow 5 minutes warm-up prior to beginning these checks. These performance checks, in addition to providing verification of Model 26A specifications, can also be used to locate problem areas when the Model 26A is malfunctioning.

4-6. CALIBRATION ACCURACY 0.300 to 0.060 VOLT RMS.

a. Connect equipment as shown in Figure 4-2A.

b. Adjust the dc source until DC Voltmeter reads 0.3000 volt and adjust Differential Voltmeter for a null.

c. Connect equipment as in Figure 4-2B and adjust 1 MHz source until Differential Voltmeter reads as in (b).

d. Record reading of DC Voltmeter.

e. Repeat (a) through (d) using voltages and micropotentiometers as shown in the Table 4-3:

TABLE 4-2 TEST EQUIPMENT REQUIRED

INSTRUMENT TYPE	SPECIFICATION	RECOMMENDED
Micropotentiometer	DC to MHz <0.1% Conversion Error	Ballantine Model 440
DC Digital Voltmeter	100 mV - 100 V f.s. .015% Accuracy	Fluke Model 8300A Option -01
DC Differential Voltmeter	100 µV f.s. Null Sensitivity	Fluke Model 881AB
1 MHz Generator	100 mV - 3 Volts rms from 50 Ω	Hewlett-Packard 651B
True RMS Voltmeter	1 mV - 3V f.s., DC output 10 V at f.s., ±1% Accuracy at 1 MHz, input impedance 2 MΩ <25 pF	Boonton 93AD
Power Supply	0 - 4 VDC at 50 mA	Power Designs Model 5015T
Attenuator	0 - 120 dB	Hewlett-Packard 355D

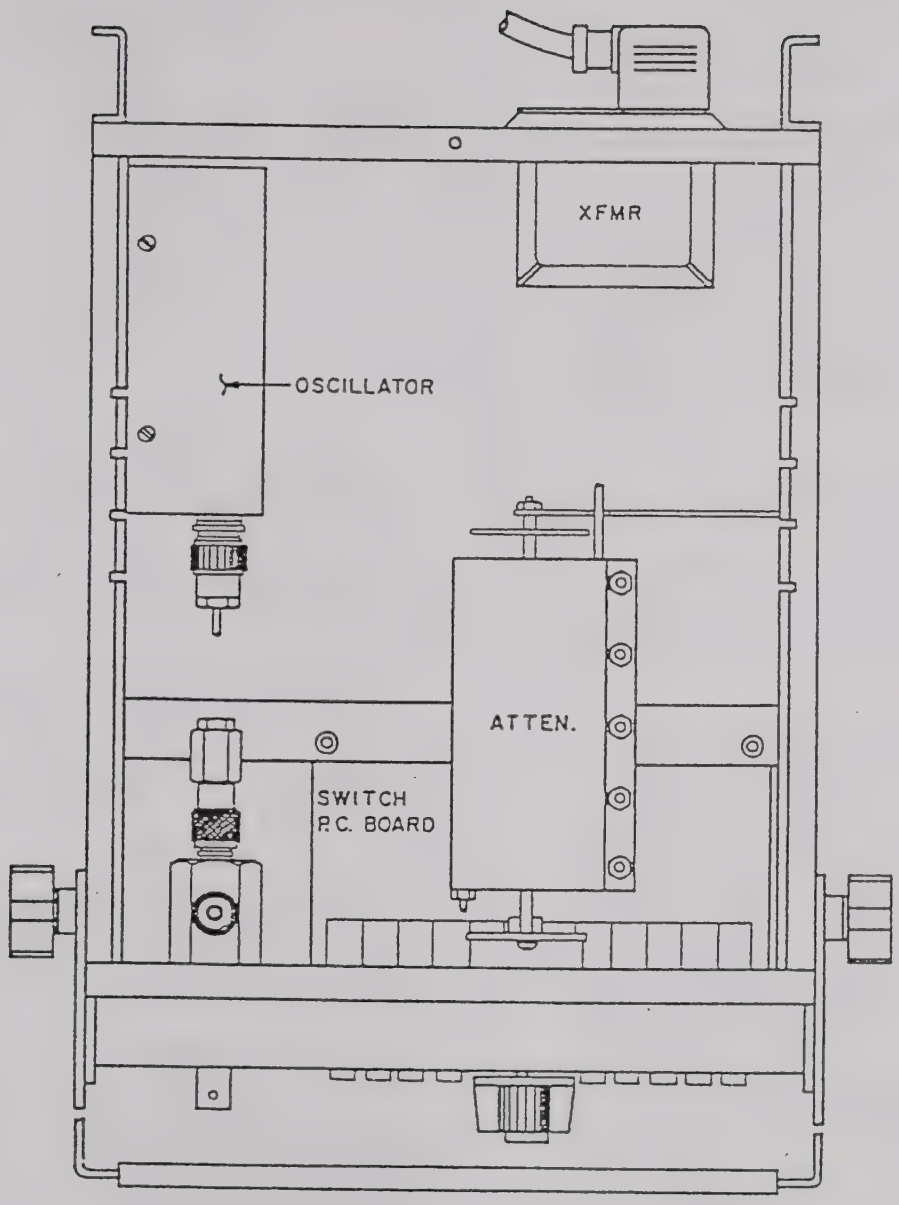


FIGURE 4-1. LOCATION OF PRINCIPAL SUB-ASSEMBLIES

TABLE 4-3
CALIBRATION LEVELS

DC Voltage	Resistor/ Thermocouple	26A Scale Reading
0.3000	4.7 Ω/50 mA	3
0.2700	4.7 Ω/50 mA	2.7
0.2400	4.7 Ω/50 mA	2.4
0.2100	4.7 Ω/50 mA	2.1
0.1800	4.7 Ω/50 mA	1.8
0.1500	4.7 Ω/50 mA	1.5
0.1200	22 Ω/5 mA	1.2
0.0900	22 Ω/5 mA	0.9
0.0600	22 Ω/5 mA	0.6

NOTE

RMS Voltmeter should be ranged down to 100 mV F.S. for the 0.1, 0.09, and 0.06 volt steps.

f. Connect equipment as in Figure 4-3. Set the 26A controls to 0.3 volt full scale and scale reading to 3.

g. Read DC Voltmeter and compare with reading in (d). Voltages should be within ±0.5%.

h. Repeat (f) and (g) for 26A steps listed in Table 4-3. Agreement should be ±0.5%.

NOTE

The 0.09 and 0.06 volt readings are read in the 0.3 volt FULL-SCALE position of the 26A.

4-7. ATTENUATOR TRACKING (3 VOLTS TO 0.3 mV)

a. Connect equipment as in Figure 4-4 and set the Model 26A to 0.3 volts FULL SCALE and SCALE READING to 10. Remove the 26A internal 50.00 Ω termination and temporarily remove yellow wire from A3 assembly. Connect a jumper wire between any adjacent contacts on rear switch wafer of Precision Attenuator Assembly A1. The internal 50 Ω termination is now used with a suitable adapter to terminate the test attenuator in Figure 4-5.

b. Set Std. Attenuator to 0 dB position; RMS Voltmeter to 300 mV f.s.

c. Record DC Voltmeter reading.

d. Step Std. Attenuator to -10 dB; RMS Voltmeter to 1 volt f.s. Record DC Voltmeter reading.

e. Change Model 26A to 1 volt f.s. and Std. Attenuator to 0 dB. Record DC Voltmeter reading.

f. Change Model 26A to 1 volt f.s. and Std. Attenuator to 0 dB. Record DC Voltmeter reading.

g. Voltages in steps (e) and (f) should agree within ±0.5%.

h. Change Std. Attenuator to -10 dB and down range RMS Voltmeter to 300 mV f.s. Record DC voltage.

i. Change Model 26A to 0.3 volts and Std. Attenuator to 0 dB position and record DC voltage. Again (h) and (i) should be within ±0.5%. Any deviation of the Std. Attenuator from 10.00 dB should be considered when computing absolute ratio errors.

j. Remove jumper on A1, reconnect yellow wire to A3 and reinstall 50 Ω internal termination.

4-8. CALIBRATION PROCEDURE. Remove instrument covers and oscillator P.C. board shield cover. The Model 26A should be turned on and allowed to warm up for several minutes before commencing adjustment.

NOTE

The SCALE READING switch should be set to 10 before proceeding.

a. Power Supply. Connect a digital voltmeter to the +15 volt test point located on the oscillator assembly shield. Adjust A3 R16 for a reading of +15.0 ±0.1 volt.

b. 0.3 Volt, 0.06 Volt, 0.1 Volt Adjustment. Use the procedure outlined in Paragraphs 4-6(a) - 4-6(e) for 0.3 volt, 0.06 volt and 0.1 volt.

c. Connect equipment as shown in Figure 4-3. Set Model 26A output to 0.3 volt. Note reading of DC voltmeter.

d. Adjust A3 R18 until DC readings in (b) and (c) agree.

e. Set Model 26A to 0.06 volt. Note reading of DC Voltmeter.

f. Adjust A2 R3 until DC readings in (b) and (e) agree.

g. There will be a slight interaction between these adjustments. Repeat (c) through (f) until DC readings agree at 0.3 volt and 0.06 volt.

h. Set Model 26A to 0.1 volt full scale and SCALE READING to 10. Note

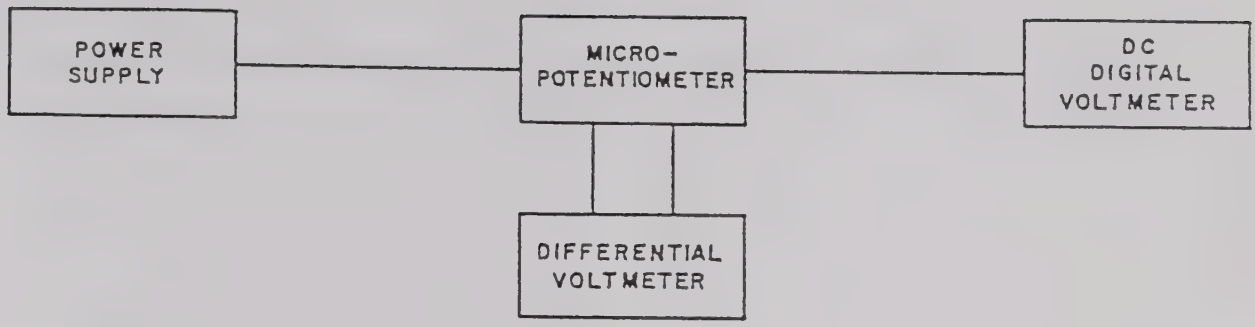


Figure 4-2A

DC MICROPOTENTIOMETER TEST SET-UP

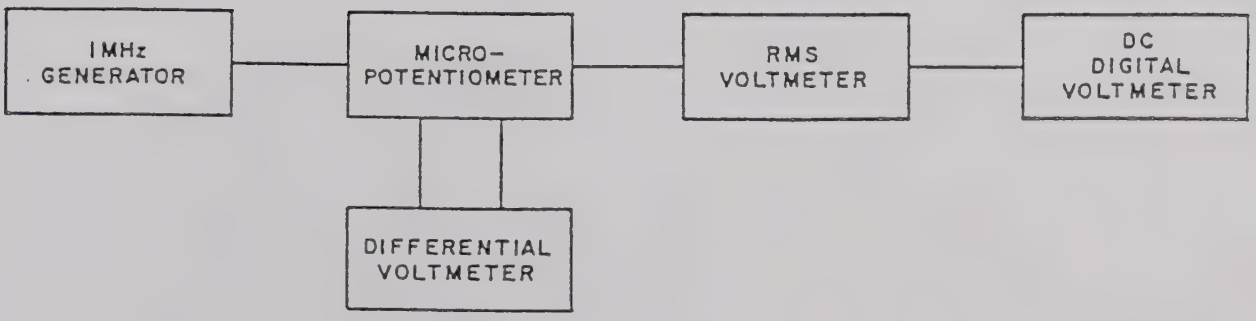


Figure 4-2B

AC MICROPOTENTIOMETER TEST SET-UP

Figure 4-3.

MODEL 26A DOWNSCALE TEST SET-UP

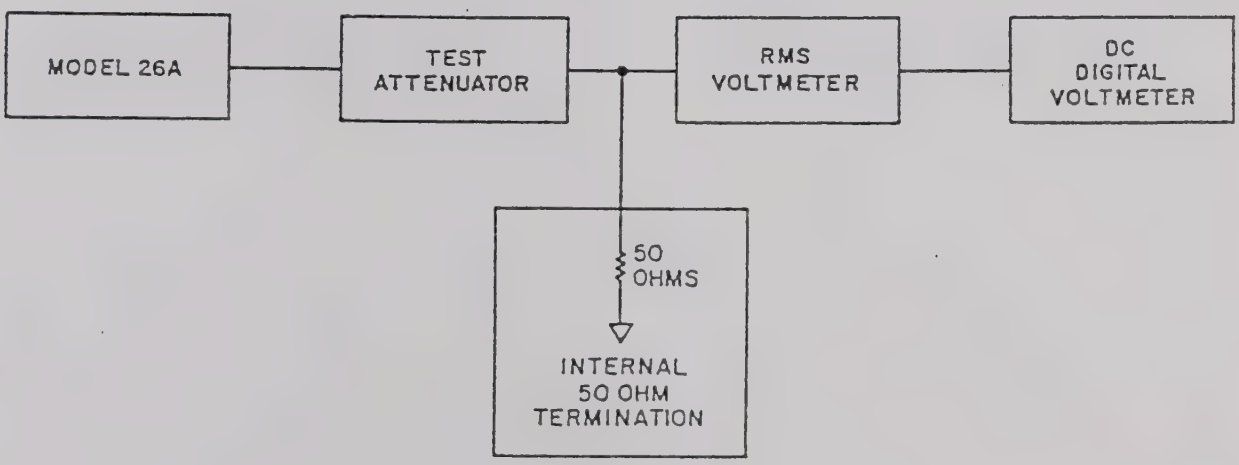


Figure 4-4.

MODEL 26A FULLSCALE TEST SET-UP

4-8. (Cont.)

the DC Voltmeter reading.

i. Adjust A3 R4 until the DC readings in (b) and (h) agree.

4-9. TROUBLESHOOTING. If faulty operation of the Model 26A is evident or if the calibration procedure in the preceding section fails to correct an inaccurate output, the following steps will help to isolate and correct the fault.

a. Schematic Diagrams. The schematic diagrams located in the back of the manual show all electrical components, test points, waveforms and DC voltages. Components which appear in the outlined areas are located on, or in, the assembly indicated within these areas. Any component not located in an outlined area is wired to the chassis or front or rear panel. External markings are indicated by a solid rectangle around the name of the control or connector.

b. Components which are identified on the schematic can be located on an assembly or circuit board by referring to the layout or drawing which appears on the page opposite the schematic drawing.

4-10. TROUBLESHOOTING PROCEDURE.

a. Power Supply Reference Circuits (A3). Proper operation of the power supply and reference circuits is indicated by correct DC voltage levels at indicated points in the circuits. Active device failure is most likely. Since all active devices are in sockets, simple replacement will usually correct the problem. Any device replacement in these circuits requires that the 26A be recalibrated.

b. Oscillator and AGC Systems (A2). A2 IC1 generates the 1 MHz signal which ultimately appears at the output connector.

All signals and DC voltages are TTL levels. Pin 14 of A2 IC1 should be approximately 5 VDC which is supplied by A2 Q1. A2 IC1 may be replaced without recalibration. A2 Q3 and A2 Q4 provide power to amplifier A2 Q2 and would be suspect if improper waveforms appear at test point 3 or 4. These may be replaced without recalibration. A low or high output power on all ranges may be caused by failure of A2 A2. The DC voltages at pins 2 and 3 must be equal for proper operation. Recalibration is necessary when A2 A2 is replaced.

c. Attenuator Assembly (A1). A malfunction in the precision attenuator would be indicated by incorrect output voltages on one or more of the full scale output settings. By noting the incorrect full-scale switch positions and the switching sequence shown on the schematic diagram, a defective resistor or switch contact may be quickly isolated. After component replacement or switch repair, attenuator tracking should be checked. Note that the attenuator switch shield must be properly installed before tracking measurements are attempted.

TABLE OF REPLACEABLE PARTS

Reference		Description	BEC Part No.
		REAR PANEL	
F1	Fuse, Slo-Blo	0.10 A 100/120 V	545519
F1	Fuse, Slo-Blo	0.06 A 200/240 V	545518
P1	Connector, Voltage Selector	Corcom No. 6J1	483197
T1	Power Transformer	Boonton Electronics	446071
		SUB PANEL	
CR1	Diode, LED	MV5025	536000
J3	Connector, TNC	Specialty Conn. No. 24JR120-2	479304
J4	Connector, TNC	Specialty Conn. No. 24JR120-2	479304
J5	Connector, BNC	Dage 081-1	479123
P4	Plug, TNC	General No. 4000-0009	477299
R1	Resistor, MF	50.00 Ω 0.1% 1 W	326993
S1	Line Switch	Microswitch No. 8A2011	465202
		ATTENUATOR (A1)	
P2	Plug, TNC	Specialty No. 24P104-2	477292
P3	Plug, TNC	Specialty No. 24P104-2	477292
R1	Resistor, MF	53.27 Ω 0.1% 1/2 W	326999
R2	Resistor, MF	789.8 Ω 0.1% 1/2 W	326994
R3	Resistor, MF	53.27 Ω 1% 1/2 W	326999
R4	Resistor, MF	53.27 Ω 1% 1/2 W	326999
R5	Resistor, MF	789.8 Ω 0.1% 1/2 W	326994
R6	Resistor, MF	53.27 Ω 0.1% 1/2 W	326999
R7	Resistor, MF	61.11 Ω 0.1% 1/2 W	326998
R8	Resistor, MF	247.5 Ω 0.1% 1/2 W	326995
R9	Resistor, MF	61.11 Ω 0.1% 1/2 W	326998
R10	Resistor, MF	96.25 Ω 0.1% 1/2 W	326996
R11	Resistor, MF	71.15 Ω 0.1% 1/2 W	326997
R12	Resistor, MF	96.25 Ω 0.1% 1/2 W	326996
S1	Switch, Rotary	Oak Type N	466242
		OSCILLATOR (A2)	
C1 through C4	Capacitor, Feedthru	1000 pF 20% 500 V	227105
J1	Connector	Molex	479258
J2	Jack, TNC	Specialty No. 24JK120-2	479304
		OSCILLATOR PC BOARD (A2)	
A1	Op. Amp.	CA3130S	535032
A2	Op. Amp.	CA3130S	535032
C1	Capacitor, Cer.	0.1 µF +80% -20% 25 V	224124
C2	Capacitor, Elec.	10 µF 20% 20 V	283205
C3	Capacitor, Mica	200 pF 5% 500 V	200004
C4	Capacitor, Cer.	0.1 µF +80% -20% 25 V	224124
C5	Capacitor, Mica	200 pF 5% 500 V	200004
C6	Capacitor, Elec.	10 µF 20% 20 V	283205
C7	Capacitor, Mica	47 pF 5% 300 V	205018
C8	Capacitor, PC	0.01 µF 10% 400 V	234126
C9	Capacitor, Mica	240 pF 5% 500 V	200506
C10	Capacitor, Mica	390 pF 5% 500 V	200108
C11	Capacitor, Mica	2700 pF 5% 500 V	200517
C12	Capacitor, Mica	3900 pF 5% 500 V	200523

TABLE OF REPLACEABLE PARTS (CONT.)

Reference		Description	BEC Part No.
C13	Capacitor, Mica	3900 pF 5% 500 V	200523
C14	Capacitor, Mica	2700 pF 5% 500 V	200517
CR1	Diode, Zener	1 N825A (6.2 V)	530155
CR2	Diode, Pair	Selected	530163
CR3	Diode, Sig.	1 N914	530058
CR4	Diode, Pair	Selected	530163
IC1	Integrated Circuit	SN7400N(Quad 2 Input NAND Gate)	534034
L1	Choke	5.6 µH 10%	400296
L2	Choke	100 µH 5%	400295
L3	Choke	470 µH 5%	400116
L4	Choke	100 µH 5%	400295
L5	Choke	15 µH 10%	400175
L6	Choke	15 µH 10%	400175
L7	Choke	15 µH 10%	400175
Q1	Transistor, FET	MPS A12	528052
Q2	Transistor, NPN	2 N3866	528116
Q3	Transistor, NPN	MPS U05	528081
Q4	Transistor, NPN	2 N3903	528024
R1	Resistor, MF	1.1 kΩ 1%	341304
R2	Resistor, Comp.	2 kΩ 5%	343329
R3	Resistor, Var.	100 kΩ 10% 1 W	311366
R4	Resistor, Comp.	510 Ω 5%	343268
R5	Resistor, MF	49.9 kΩ 1%	341467
R6	Resistor, Comp.	510 Ω 5%	343268
R7	Resistor, MF	25.5 kΩ 1%	341439
R8	Resistor, Comp.	47 kΩ 5%	343465
R9	Resistor, Comp.	33 kΩ 5%	343450
R10	Resistor, Comp.	2 kΩ 5%	343329
R11	Resistor, MF	232 kΩ 1%	341535
R12	Resistor, Comp.	220 Ω 5% 2 W	304071
R13	Resistor, Comp.	10 kΩ 5%	343400
R14	Resistor, Comp.	3 kΩ 5%	343346
R15	Resistor, MF	1.1 kΩ	341304
R16	Resistor, Comp.	5.6 Ω 5%	343072
R17	Resistor, MF	1 MΩ 1%	342600
R18	Resistor, MF	1 MΩ 1%	342600
R19	Resistor, MF	10 kΩ 1%	341400
R20	Resistor, MF	50.00 Ω 0.1% 1 W	326993
R21	Resistor, Comp.	10 kΩ 5%	343400
Y1	Crystal	1 MHz ±0.01%	547029
		SWITCH PC BOARD (A3)	
A1	Op. Amp.	LM301AN	535012
C1	Capacitor, Elec.	250 µF 40 V	283207
C2	Capacitor, Cer.	33 pF 5% 1000 V	224139
C3	Capacitor, Elec.	10 µF 20% 20 V	283205
CR1	Bridge, Rectifier	VE68	532011
CR2	Diode, Sig.	1 N4001	530151
CR3	Diode, Zener	1 N821 (6.2 V)	530050
CR4	Diode, Sig.	1 N4001	530151
IC1	Integrated Circuit	µA7805UC (5 V) Regulator	535011
R1	Resistor, MF	1.1 kΩ 1%	341304
R2	Resistor, Comp.	750 Ω 5%	344284
R3	Resistor, MF	1.1 kΩ 1%	341304
R4	Resistor, Var.	5 kΩ 10% 1 W	311268
R5	Not Used		
R6 through R13	Resistor, MF	1.400 kΩ 0.1% 1/4 W	325909

TABLE OF REPLACEABLE PARTS (CONT.)

Reference		Description	BEC Part No.
R14	Resistor, MF	2.800 kΩ 0.1% 1/4 W	325911
R15	Resistor, MF	1.1 kΩ 1%	341304
R16	Resistor, Var.	200 Ω 10% 1 W	311269
R17	Resistor, MF	750 Ω 1%	341284
R18	Resistor, Var.	5 kΩ 10% 1 W	311268
S1	Switch, Pushbutton	Centralab Type PB-10 (Modified)	465205
		MISCELLANEOUS	
	Cable	Boonton Electronics	025011

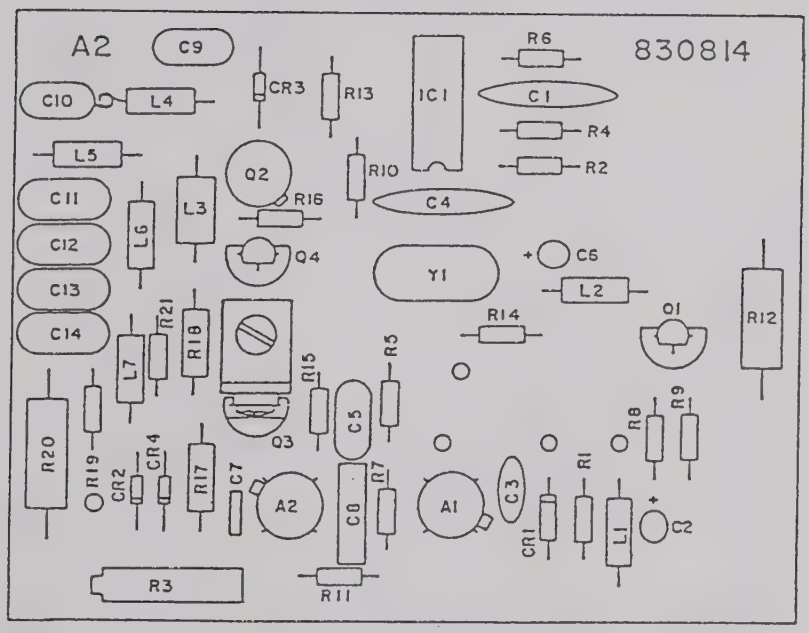
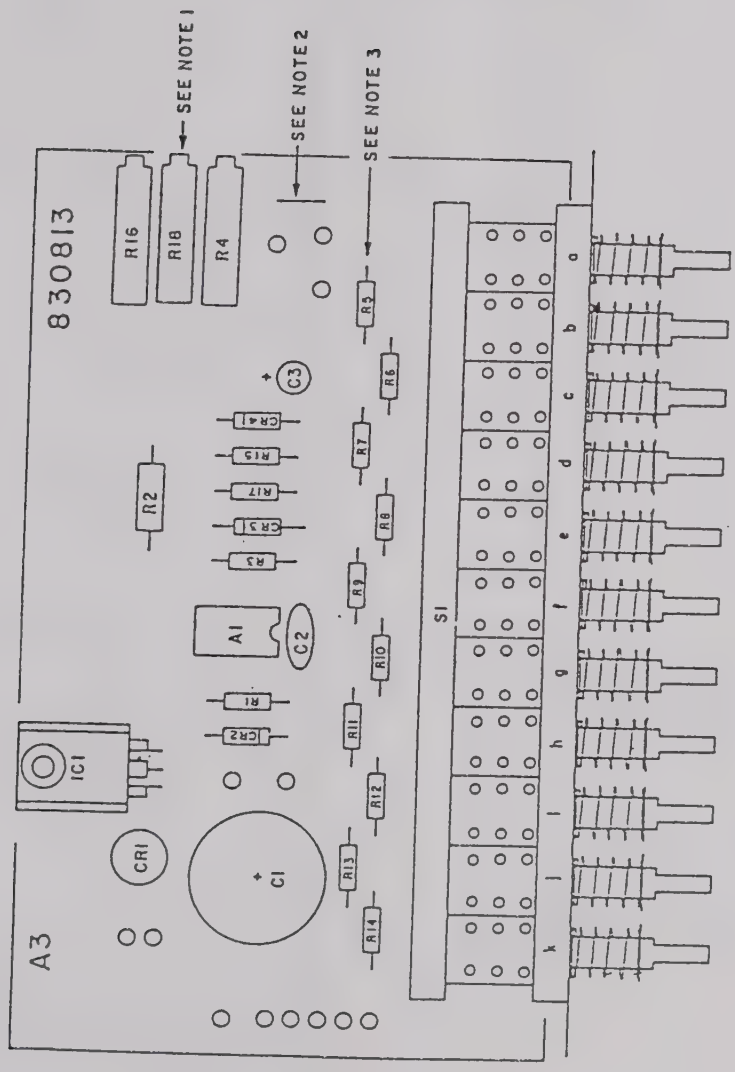


Figure 6-1

OSCILLATOR P.C. BOARD A2



NOTES:
1. R18 IS USED ON MODEL 26A ONLY.
2. THIS JUMPER USED ON MODEL 25A ONLY.
3. ON MODEL 25A, R3 IS REPLACED BY A JUMPER.

Figure 6-2

SWITCH P.C. BOARD A3

VOLTS ±10%	100/120	200/240	50 - 400 Hz
FUSE	0.1 A	0.06 A	7 VA

TESTPOINT ① ② ③ ④

WAVEFORM: ① 120 Hz (23V P/P) ② 1MHz (1V, 0V) ③ 1MHz, 30V P/P ④ 1MHz, 75V P/P

P1 S1 T1 F1 CR1 MV5025 BRN WHT/BRN

120V 240V GY/WHT BLU BLK BLK/WHT BLK/RED RED/WHT BLK/YEL

A3 SWITCH P.C. BOARD

CR2 IN4001 R2 750 IC1 μA7805 +23.0 +15.0 C1 250μF 40V R1 1K CR VE-68 20 VAC

A1 LM301AN +10.0 +6.4 +6.4 +7.0 +5.5 R3 1K R15 1K R16 200 R17 750 C2 33 CR3 IN821 CR4 IN4001 C3 10μF 20V +12

SCALE READING

0	3
9	2.7
8	2.4
7	2.1
6	1.8
5	1.5
4	1.2
3	0.9
2	0.6
0	0

S1 a b c d e f g h i j k

R4 5K R18 5K 5.21 R6 1.400K 4.69 R7 1.400K 4.16 R8 1.400K 3.64 R9 1.400K 3.12 R10 1.400K 2.60 R11 1.400K 2.08 R12 1.400K 1.56 R13 1.400K 1.04 R14 2.800

YEL GRN ORN BLK BLU BLK/WHT

P1 J1 RED C1 1000 V10 C2 1000 GRN C3 1000 BLU C4 1000

L1 5.6μH +15V R1 1.1K 6.2 CR1 IN825A +6.0 C2 10μF 20V R8 47K R12 220 +9.4 Q1 MPSA12 +4.9 L2 100μH +5V R9 33K C6 10μF 20V R14 3K

+5V C4 0.1μF IC1a SN7400N Y1 1MHz IC1b IC1c R4 510 R6 510 C1 0.1μF R2 3K R13 10K R10 3K

Q2 2N3866 CR3 IN914 ③ C10 390 ④ C9 240 L4 100μH L5 15μH L6 15μH L7 15μH R20 50.00 C11 2700 C12 3900 C13 3900 C14 2700

CR4 5082-2800 R19 10K +7.7 R17 1M R18 1M L3 470μH +9.2 R16 5.6 +8.7 C8 0.01μF Q4 2N3903 Q3 MPSU05 +9.5 +15V

+15V A1 CA3130S +5.2 R3 100K C3 200 +7.9 CR2 5082-2800 +5.4 R7 25.5K C5 200 +7.7 R11 232K

+15V A2 CA3130S R15 1K C7 47

R2 10K

P2 J2 WHT

A1 ATTENUATOR ASSEMBLY S1

3000
1000
300
100
30
10
3
1
0.3
mV

FULL SCALE

R2 789.8 R3 53.27 R5 789.8 R4 53.27 R6 53.27 R8 247.5 R7 61.11 R9 61.11 R11 711.5 R10 96.25 R12 96.25

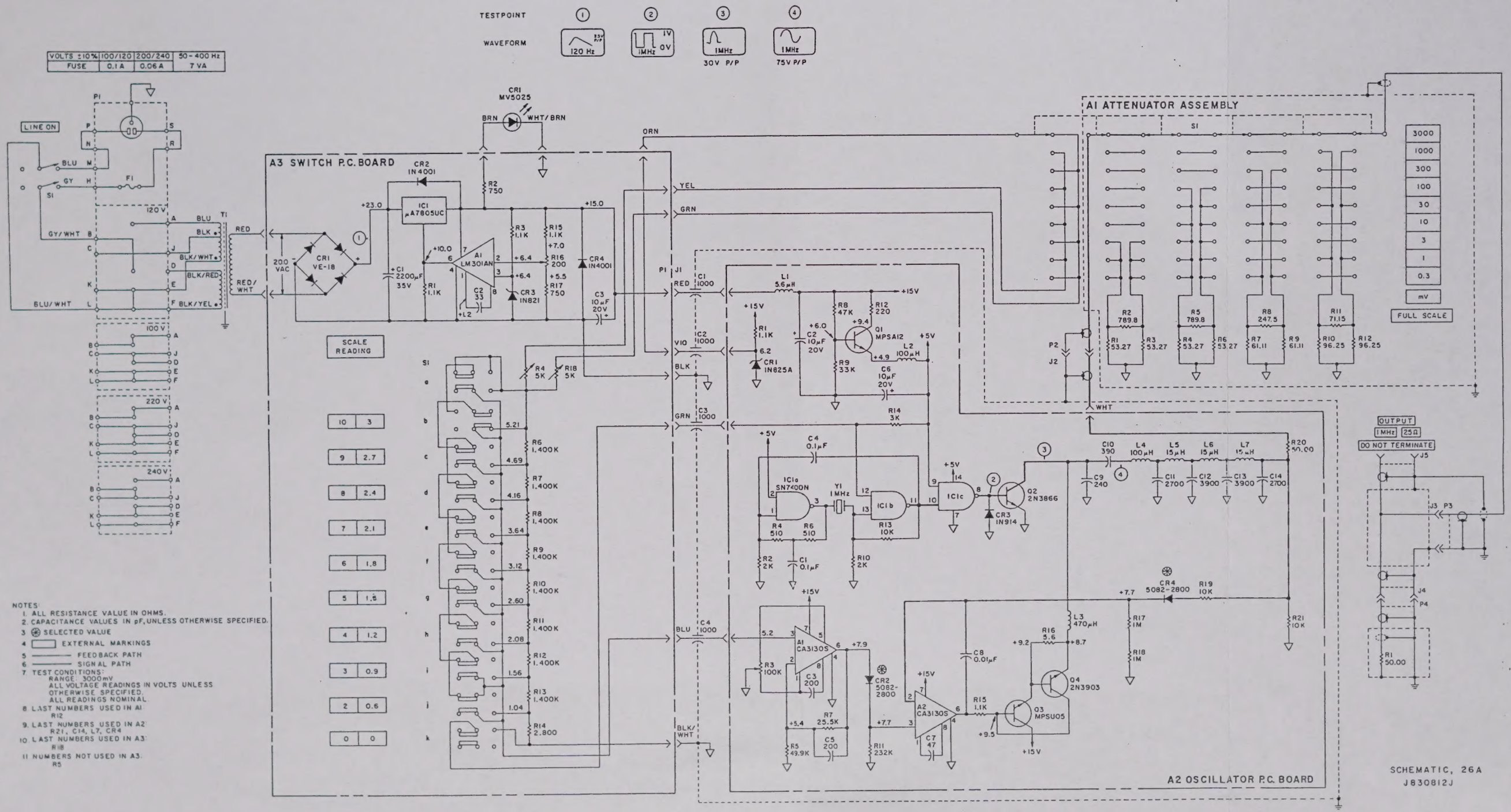
OUTPUT 1MHz 25Ω DO NOT TERMINATE J5 J3 P3 J4 P4 R1 50.00

NOTES:
1. ALL RESISTANCE VALUE IN OHMS
2. CAPACITANCE VALUES IN pF, UNLESS OTHERWISE SPECIFIED
3. ⊛ SELECTED VALUE
4. EXTERNAL MARKINGS
5. FEEDBACK PATH
6. SIGNAL PATH
7. TEST CONDITIONS
   RANGE 300.0 mv
   ALL VOLTAGE READINGS IN VOLTS UNLESS OTHERWISE SPECIFIED
   ALL READINGS NOMINAL
8. LAST NUMBERS USED IN A1 R12
9. LAST NUMBERS USED IN A2 R21, C14, L7, CR4
10. LAST NUMBERS USED IN A3 R18
11. NUMBERS NOT USED IN A3 R5

A2 OSCILLATOR P.C. BOARD

BOONTON ELECTRONICS CORPORATION

MODEL 26A Schematic J830812B

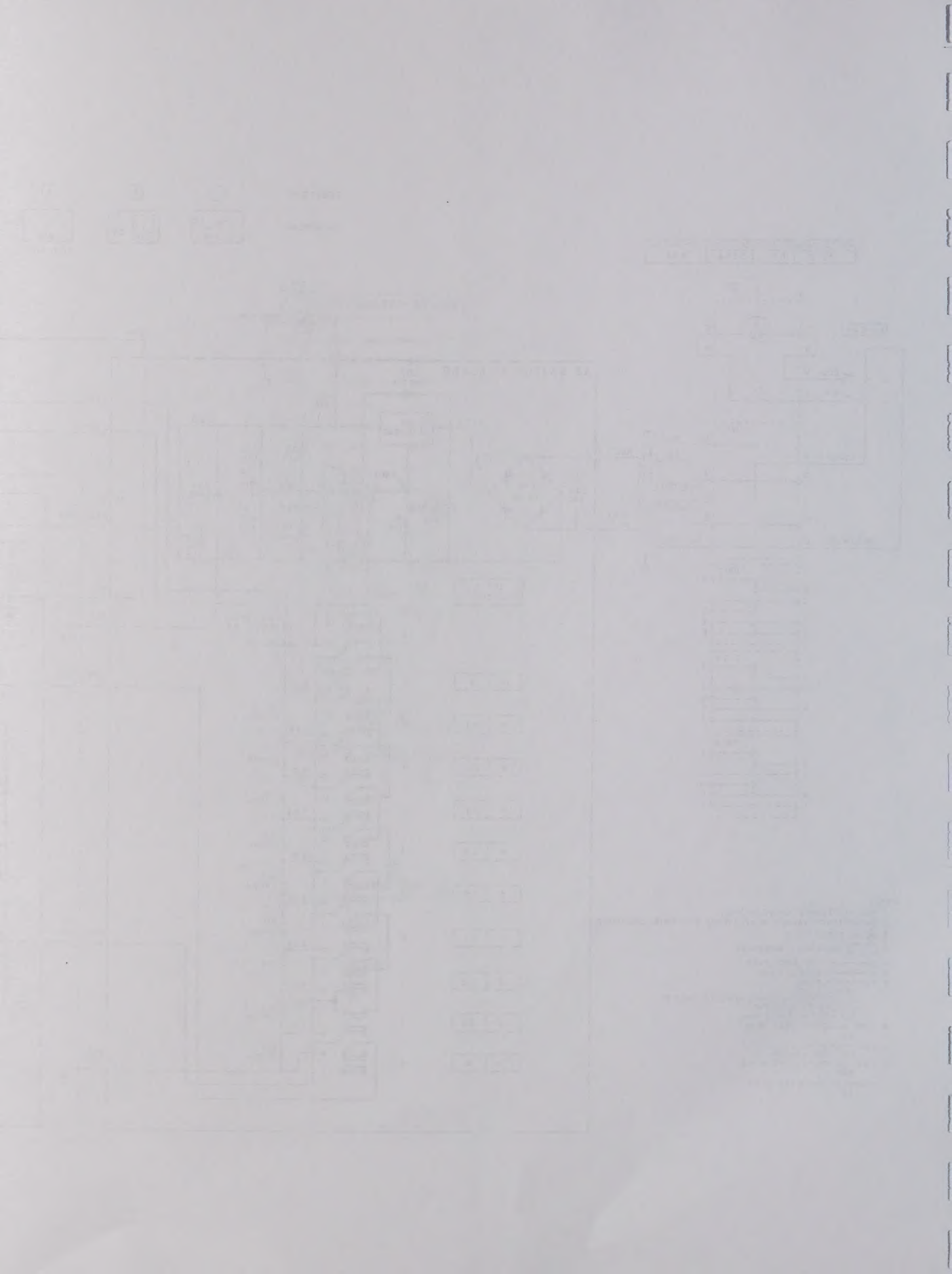


NOTES:
1. ALL RESISTANCE VALUE IN OHMS.
2. CAPACITANCE VALUES IN pF, UNLESS OTHERWISE SPECIFIED.
3. ⊛ SELECTED VALUE
4. ▭ EXTERNAL MARKINGS
5. ——— FEEDBACK PATH
6. ——— SIGNAL PATH
7. TEST CONDITIONS:
   RANGE: 3000mV
   ALL VOLTAGE READINGS IN VOLTS UNLESS OTHERWISE SPECIFIED.
   ALL READINGS NOMINAL.
8. LAST NUMBERS USED IN A1: R12
9. LAST NUMBERS USED IN A2: R21, C14, L7, CR4
10. LAST NUMBERS USED IN A3: R18
11. NUMBERS NOT USED IN A3: R5

SCHEMATIC, 26A
J830812J

Figure 6-3

Mainframe Schematic



MP MASTER
MA22826